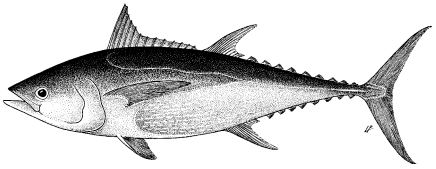
DRAFT: EXECUTIVE SUMMARY: LONGTAIL TUNA

Indian Ocean Tuna Commission
Commission des Thons de l'Océan Indien
iotc ctoi



Status of the Indian Ocean longtail tuna (LOT: *Thunnus tonggol*) resource

TABLE 1. Longtail tuna: Status of longtail tuna (*Thunnus tonggol*) in the Indian Ocean

Area[1]	Indicators		2014 stock status determination
Indian Ocean	Catch[2] 2013: Average catch[2] 2009–2013:	158,996 t 151,829 t	
	MSY: F_{MSY}: B_{MSY}: F_{2012}/F_{MSY}: B_{2012}/B_{MSY}: B_{2012}/B_0:	120 Kt [79–171 Kt] 0.39 (0.27–0.51) 255 Kt (173–377 K t) 1.23 (0.47–2.11) 1.05 (0.59–1.49) 0.53(0.3–0.75)	

[1]Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence.
[2]Nominal catches represent those estimated by the IOTC Secretariat. If these data are not reported by CPCs, the IOTC Secretariat estimates total catch from a range of sources including: partial catch and effort data; data in the FAO FishStat database; catches estimated by the IOTC from data collected through port sampling; data published through web pages or other means; data reported by other parties on the activity of vessels; and data collected through sampling at the landing place or at sea by scientific observers.

Colour key	Stock overfished($SB_{year}/SB_{MSY}< 1$)	Stock not overfished ($SB_{year}/SB_{MSY}\geq 1$)
Stock subject to overfishing($F_{year}/F_{MSY}> 1$)		
Stock not subject to overfishing ($F_{year}/F_{MSY}\leq 1$)		
Not assessed/Uncertain		

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. Stock Reduction Analysis techniques indicate that the stock is being exploited at a rate that exceed F_{MSY} in recent years (Fig. 1). Whether a four quadrant stock structure of catches in the Indian Ocean or a one stock assumption is used in the analysis, the conclusions remain the same. Another analysis conducted on the NWIO with a Surplus Production Model (ASPIC) also indicates that the stock is subject to overfishing. More traditional methods of stock assessment need to be conducted by developing indices of abundance using catch and effort series from I.R. Iran and Indonesia. Based on the weight-of-evidence available, including that estimated values of current biomass are near the estimated abundance to produce B_{MSY} in 2012, and that fishing mortality has exceeded F_{MSY} values in recent years, the stock is considered to be **not overfished**, but **subject to overfishing** (Table 1; Fig. 1).

Outlook. There remains considerable uncertainty about stock structure and about the total catches in the Indian Ocean. The continued increase of annual catches for longtail tuna in recent years has further increased the pressure on the Indian Ocean stock as a whole. The apparent fidelity of longtail tuna to particular areas/regions is a matter for concern as overfishing in these areas can lead to localised depletion. Research emphasis on improving indicators and exploration of stock structure and stock assessment approaches for data poor fisheries are warranted. There is a continued high to very high risk of exceeding MSY-based reference points by 2015, even if catches are reduced to 90% of the current (2012) levels (67% risk that $SB_{2015}<SB_{MSY}$, and 93% risk that $F_{2015}>F_{MSY}$) (Table 2).

The following should be noted:

- The Maximum Sustainable Yield estimate of 120,000 t is likely being exceeded in recent years.
- Reconstruction of the catch history needs to occur, as do annual catches submitted to the Secretariat.
- Improvement in data collection and reporting is required to assess the stock using more traditional stock assessment techniques.

- Given the rapid increase in longtail tuna catch in recent years, some measures need to be taken to slow or reduce catches in the Indian Ocean (Table 2).
- Improvement in data collection and reporting is required to assess the stock status, primarily abundance index series from I.R. Iran, Oman and Indonesia.
- Limit reference points: The Commission has not adopted limit reference points for any of the neritic tunas under its mandate.

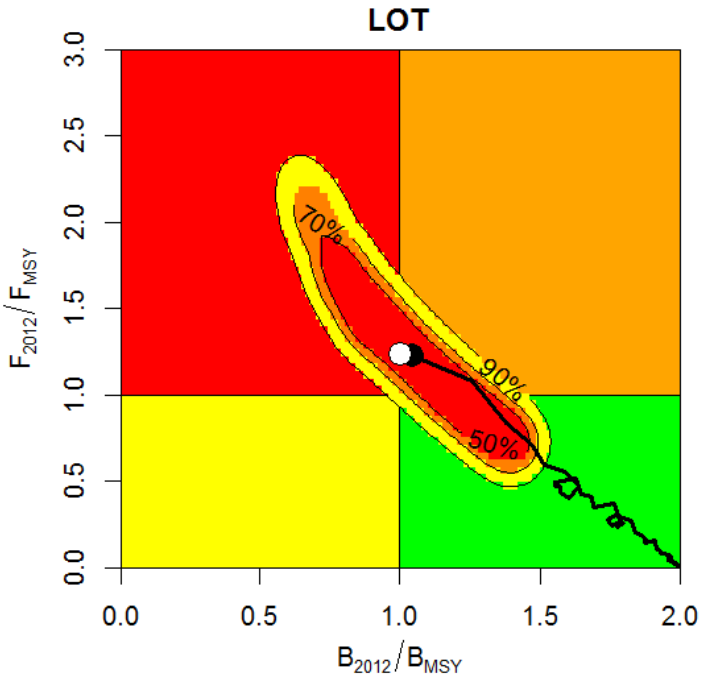


Fig. 1. Longtail tuna: PFCRA Aggregated Indian Ocean assessment Kobe plot. The Kobe plot presents the trajectories for the range of plausible model options included in the formulation of the final management advice. The trajectory of the geometric mean of the plausible model options is also presented.

TABLE 2. Longtail tuna: 2014 PFCRA Aggregated Indian Ocean assessment Kobe II Strategy Matrix. Probability (percentage) of plausible models violating the MSY-based reference points for five constant catch projections (2012 catch level, -10%, -20%, -30% and +20%) projected for 3 and 10 years. Note: from the 2014 stock assessment using catch estimates at that time.

Reference point and projection timeframe	**Alternative catch projections (relative to 2012) and weighted probability (%) scenarios that violate reference point**				
	70% (112,372 t)	**80%** (128,425 t)	**90%** (144,479 t)	**100%** (160,532 t)	**120%** (187,220 t)
$B_{2015} < B_{MSY}$	17%	37%	67%	87%	96.2%
$F_{2015} > F_{MSY}$	5%	53%	93%	100%	100%
$B_{2022} < B_{MSY}$	24%	56%	80%	95%	100%
$F_{2022} > F_{MSY}$	20%	60%	86%	100%	100%

Note: As detailed in Recommendation 14/07, the colour coding used above refers to 25% probability levels associated with the default target reference points of the Commission.

APPENDIX I

SUPPORTING INFORMATION

(Information collated from reports of the Working Party on Neritic Tunas and other sources as cited)

CONSERVATION AND MANAGEMENT MEASURES

Longtail tuna (*Thunnus tonggol*) in the Indian Ocean is currently subject to a number of Conservation and Management Measures adopted by the Commission:

- Resolution 13/03 on the recording of catch and effort by fishing vessels in the IOTC area of competence
- Resolution 14/05 concerning a record of licensed foreign vessels fishing for IOTC species in the IOTC area of competence and access agreement information
- Resolution 12/11 *on the implementation of a limitation of fishing capacity of Contracting Parties and Cooperating Non-Contracting Parties*
- Resolution 10/02 *mandatory statistical requirements for IOTC Members and Cooperating non-Contracting Parties (CPC's)*
- Resolution 10/08 *concerning a record of active vessels fishing for tunas and swordfish in the IOTC area*

FISHERIES INDICATORS

Longtail tuna: General

Longtail tuna (*Thunnus tonggol*) is an oceanic species that forms schools of varying sizes. It is most abundant over areas of broad continental shelf. Table 3 outlines some key life history parameters relevant for management.

TABLE 3. Longtail tuna: Biology of Indian Ocean longtail tuna (*Thunnus tonggol*)

Parameter	Description
Range and stock structure	An oceanic species that forms schools of varying sizes. It is most abundant over areas of broad continental shelf. Feeds on a variety of fish, cephalopods, and crustaceans, particularly stomatopod larvae and prawns. No information is available on the stock structure of longtail tuna in the Indian Ocean.
Longevity	~20 years
Maturity (50%)	**Age**: n.a.; females n.a. males n.a. **Size:** females and males ~40 cm FL (Pacific Ocean).
Spawning season	The spawning season varies according to location. Off the west coast of Thailand there are two distinct spawning seasons: January-April and August-September.
Size (length and weight)	Maximum: Females and males 145 cm FL; weight 35.9 kgs. Most common size in Indian Ocean ranges 40–70 cm. Grows rapidly to reach 40–46 cm in FL by age 1.

n.a. = not available. Sources: Chang et al. 2001, Froese & Pauly 2009, Griffiths et al. 2010a, b, Kaymaran et al. 2011

Longtail tuna – Fisheries and catch trends

Longtail tuna is caught mainly by using gillnets and, to a lesser extent, seine nets, and trolling (Table 4; Fig. 2). The catch estimates for longtail tuna were derived from small amounts of information and are therefore uncertain[1]. The catches provided in Table 4 are based on the information available at the IOTC Secretariat and the following observations on the catches cannot currently be verified. Estimated catches of longtail tuna increased steadily from the mid 1950's, reaching around 15,000 t in the mid-1970's, to over 35,000 t by the mid-1980's, and over 96,000 t in 2000. Catches dropped after 2000 to around 72,000 t by 2005 but have increased since then, with the highest catches ever recorded in 2012 at 170,000 t.

[1] The uncertainty in the catch estimates has been assessed by the Secretariat and is based on the amount of processing required to account for the presence of conflicting catch reports, the level of aggregation of the catches by species and or gear, and the occurrence of non-reporting fisheries for which catches had to be estimated.

TABLE 4. Longtail tuna: Best scientific estimates of the catches of longtail tuna by type of fishery for the period 1950–2013 (in metric tonnes) (Data as of October 2014)

Fishery	By decade (average)						By year (last ten years)									
	1950s	1960s	1970s	1980s	1990s	2000s	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Purse seine	44	204	1,308	5,385	10,937	17,719	13,313	12,395	16,132	23,837	18,875	20,649	16,538	19,775	21,113	23,227
Gillnet	2,593	5,849	8,983	24,872	39,423	58,582	46,212	45,972	52,187	61,250	66,426	83,671	101,100	117,951	114,148	107,668
Line	908	1,159	2,546	5,186	7,218	14,423	14,092	16,540	17,085	18,905	14,338	15,847	16,487	18,197	25,514	22,824
Other	0	0	125	1,091	1,993	3,732	2,912	3,750	3,637	5,685	5,460	5,300	6,442	8,393	9,027	5,276
Total	**3,546**	**7,213**	**12,963**	**36,533**	**59,572**	**94,455**	**76,529**	**78,656**	**89,041**	**109,678**	**105,099**	**125,466**	**140,567**	**164,316**	**169,802**	**158,996**

In recent years (2011–13), the countries attributed with the highest catches of longtail tuna are Iran (47%), Indonesia (16%), and to a lesser extent Malaysia, Pakistan, India, Oman, Yemen and Thailand (36%) (Fig. 3). I.R. Iran, in particular, has reported large increases in the catch of longtail tuna since 2009 where the increase in catches of longtail tuna have coincided with a decrease in catches of skipjack tuna as a consequence of increased gillnet effort in coastal waters and the Arabian Sea due to the threat of Somali piracy in the western tropical Indian Ocean.

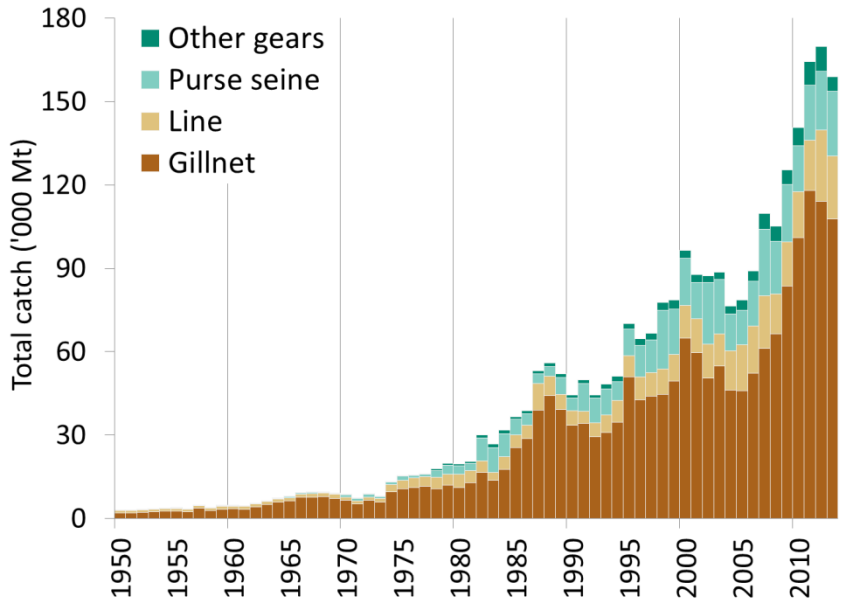


Fig. 2. Longtail tuna: Annual catches of longtail tuna by gear recorded in the IOTC Database (1950–2013). (Data as of October 2014)

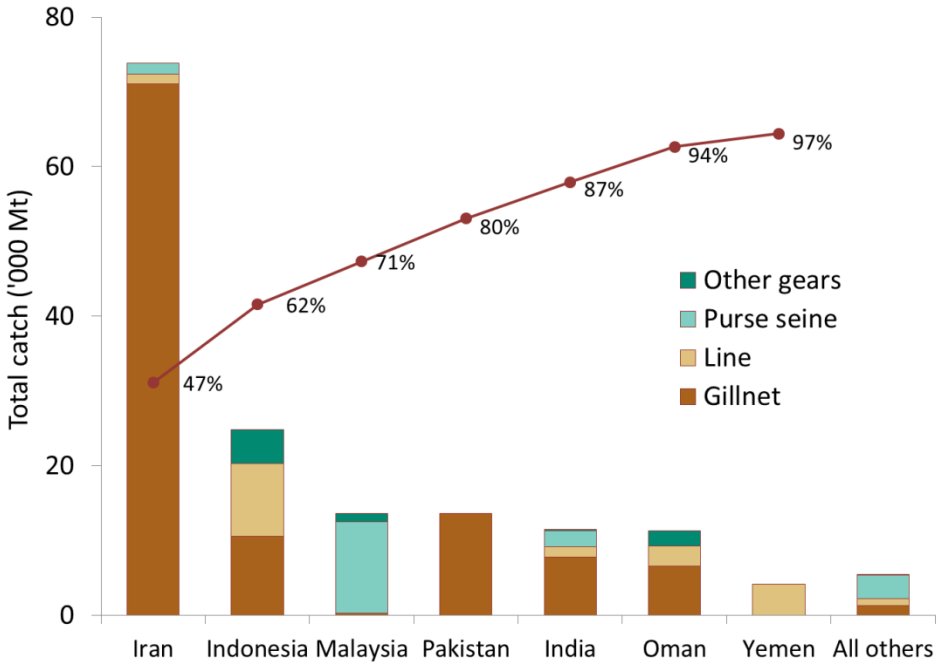


Fig. 3. Longtail tuna: Average catches in the Indian Ocean over the period 2010–12, by country. Countries are ordered from left to right, according to the importance of catches of longtail reported. The red line indicates the (cumulative) proportion of catches of longtail tuna for the countries concerned, over the total combined catches of this species reported from all countries and fisheries. (Data as of October 2014)

Longtail tuna: uncertainty of catches

Retained catches are uncertain (Fig. 4), notably for the following fisheries:

- Artisanal fisheries of Indonesia: Indonesia did not report catches of longtail tuna by species or by gear for 1950–2004; catches of longtail tuna, kawakawa and other species were reported aggregated for this period. In the past, the IOTC Secretariat used the catches reported since 2005 to break the aggregates for 1950–2004, by gear and species. However, a recent review by the IOTC Secretariat conducted by an independent consultant in 2012 indicated that catches of longtail tuna had been severely overestimated by Indonesia. While the new catches estimated for the longtail tuna in Indonesia remain uncertain, representing around 16% (30% in the past) of the total catches of this species in the Indian Ocean in recent years (2009–11), the new figures are considered more reliable than those existing in the past.
- Artisanal fisheries of India and Oman: Although these countries report catches of longtail tuna, until recently the catches have not been reported by gear. The IOTC Secretariat used alternative information to assign the catches reported by Oman by gear. The catches of India were also reviewed by the independent consultant in 2012 and assigned by gear on the basis of official reports and information from various alternative sources. The catches of longtail tuna from Oman and India represent around 14% of the total catches of this species in recent years (2010–12).
- Artisanal fisheries of Myanmar and Somalia: None of these countries have ever reported catches of longtail tuna to the IOTC Secretariat. While catch levels are unknown they are unlikely to be substantial.
- Other artisanal fisheries: The IOTC Secretariat had to estimate catches of longtail tuna for the artisanal fisheries of Yemen (no data reported to the IOTC Secretariat) and until recently Malaysia (with catches of the main neritic tunas aggregated and reported as longtail).
- Discard levels are believed to be very low although they are unknown for most fisheries.
- Changes to the catch series: Although there have not been significant changes to the total catches of longtail tuna since the WPNT meeting in 2012, the IOTC Secretariat has conducted revisions to the catch series for some fleets, primarily Malaysia following an IOTC-OFCF data mining mission in January 2014. Indonesia is also subject to an on-going review of the catch-series by the IOTC Secretariat, and further improvements to the catch series for longtail in particular are expected for WPNT in 2015.

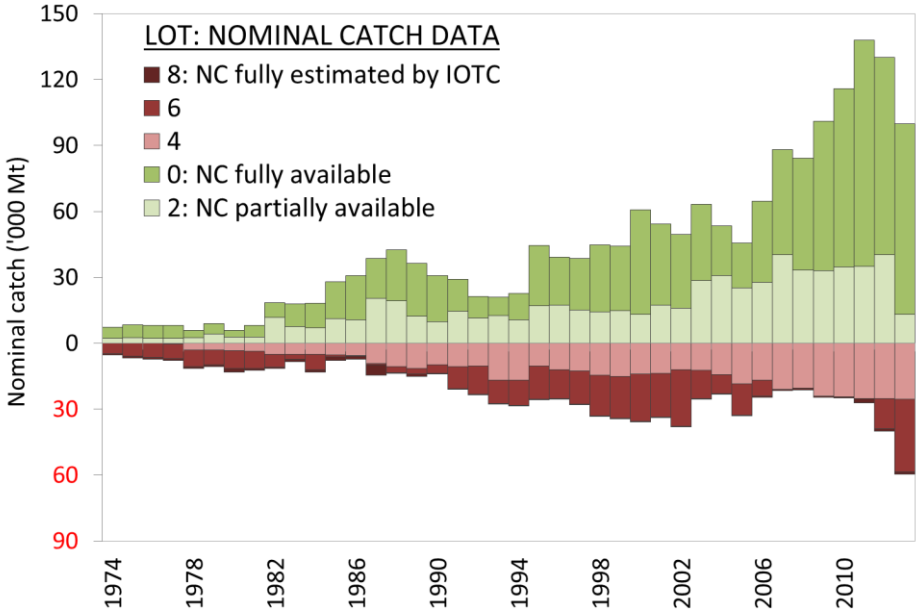


Fig. 4. Longtail tuna: Nominal catch; uncertainty of annual catch estimates (1950–2013). Catches are assessed against IOTC reporting standards, where a score of 0 indicates catches that are fully reported according to IOTC standards; catches assigned a score of between 2 – 6 do not report catch data fully by gear and/or species (i.e., partially adjusted by gear and species by the IOTC Secretariat) or any of the other reasons provided in the document; catches with a score of 8 refer to fleets that do not report catch data to the IOTC (estimated by the IOTC Secretariat). (Data as of October 2014)

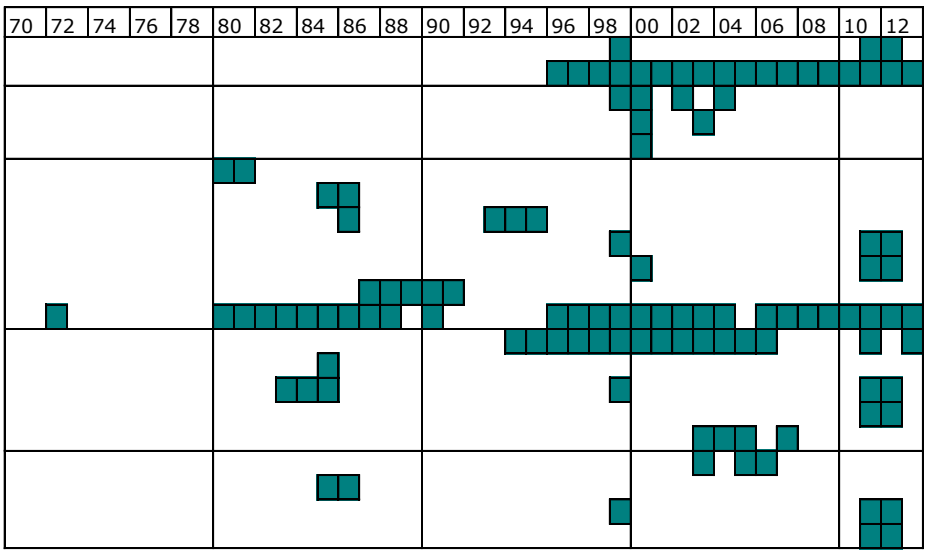
Longtail tuna – Effort trends

Effort trends are unknown for longtail tuna in the Indian Ocean.

Longtail tuna – Catch–per–unit–effort (CPUE) trends

Catch-and-effort series are available from some fisheries but they are considered highly incomplete (Table 5). In most cases catch-and-effort data are only available for short periods of time. Reasonably long catches and effort series (extending for more than 10 years) are only available for Thailand small purse seine vessels and gillnet vessels (Fig. 5).

TABLE 5. Longtail tuna: Availability of catches and effort series, by fishery and year (1970–2013)[2]. Note that no catches and effort are available at all for 1950–1971.



[2] Note that the above list is not exhaustive, showing only the fisheries for which catches and effort are available in the IOTC database. Furthermore, catch-and-effort data are sometimes incomplete for a given year, existing only for short periods.

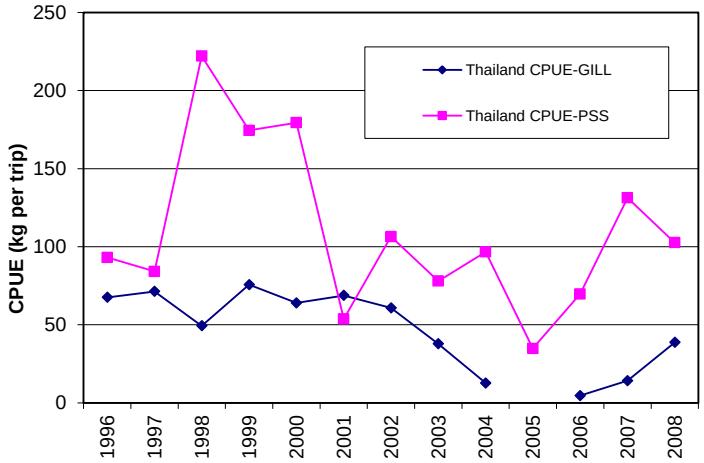
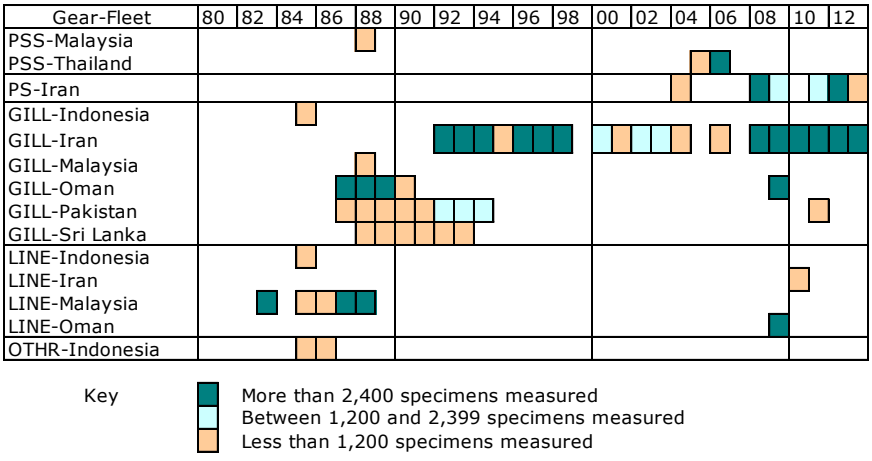


Fig. 5. Longtail tuna: Nominal CPUE series for gillnet (GILL) and coastal purse seine (PSS) fisheries of Thailand derived from the available catches and effort data (1996–2012).

Longtail tuna – Fish size or age trends (e.g. by length, weight, sex and/or maturity)

- The size of longtail tunas taken by the Indian Ocean fisheries typically ranges between 20 and 100 cm depending on the type of gear used, season and location. The fisheries operating in the Andaman Sea (coastal purse seines and trolling) tend to catch longtail tuna of small size (20–45 cm) while the gillnet fisheries of Iran and Pakistan (Arabian Sea) catch larger specimens (50–100 cm).
- Catch-at-Size(Age) tables Catches-at-Size are not available for the longtail tuna due to the paucity of size data available from most fleets (Table 6) and the uncertain status of the catches for this species (Fig. 4). Length distributions derived from the data available for gillnet fisheries are shown in Fig. 6. No data available for all other fisheries.
- Sex ratio data have not been provided to the Secretariat by CPCs.
- Trends in average weight can only be assessed for Iranian gillnets but the amount of specimens measured has been very low for a number of years (i.e., below the minimum sampling standard of one fish per tonne of catch recommended by the IOTC Secretariat) from the late-1990s to mid-2000s. (Table 6). The length frequency data available from the mid-eighties to the early nineties was obtained with the support of the IPTP (Indo-Pacific Tuna Programme); unfortunately, the data collection did not continue after the end of IPTP activities.

TABLE 6. Longtail tuna: Availability of length frequency data, by fishery and year (1980–2013)[3]. Note that no length frequency data are available at all for 1950–1982.



[3] Note that the above list is not exhaustive, showing only the fisheries for which size data are available in the IOTC database. Furthermore, when available size data may not be available throughout the year existing only for short periods

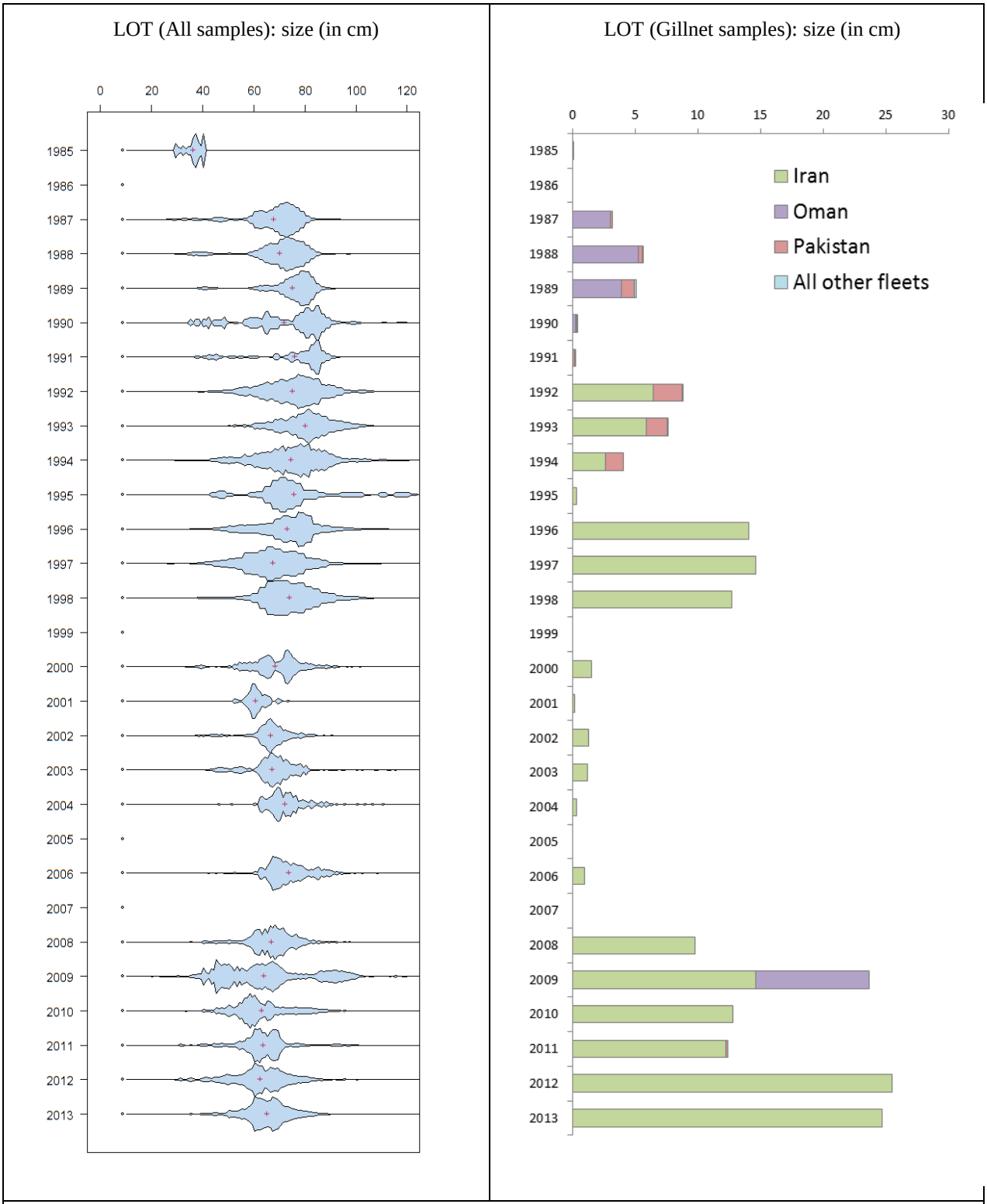


Fig. 6. Longtail tuna: Left - length frequency distributions for gillnet fisheries (total amount of fish measured by 1cm length class) derived from data available at the IOTC Secretariat. Right - number of longtail specimens sampled for lengths, by fleet (gillnet only).

STOCK ASSESSMENT

Three assessment approaches were applied to Longtail tuna in 2014, a traditional Stock Reduction Analysis technique, an alternative SRA technique (Posterior Focused Catch Reduction (PFCRA)) and a Surplus Production Model (ASPIC). The trajectories for all approaches were very similar and gave similar outcomes. For reporting and stock status advice the PFCRA approach was used as it was considered more statistically robust. Noting that the Commission adopted Resolution 12/01 *On the implementation of the precautionary approach*, which effectively means that in a situation of increased uncertainty (e.g. data poor situations), a more precautionary approach should be undertaken when developing advice and possible management actions, this approach, combined with the weight-of-evidence available (stock status indicators from data poor assessment approaches, species biology, fishery indicators), was used to determine stock status for longtail tuna (Table 7).

Stock status management advice for longtail tuna is based on the catch-based stock reduction method, combined with the known species and fishery attributes for status interpretation purposes. The approach presented is useful to assess stock status in the near term, while more traditional stock assessment approaches in the region are deferred until more data is collected and submitted in accordance with the IOTC data recording and reporting requirements for neritic tunas. More traditional methods of stock assessment need to be conducted by developing indices of abundance using catch and effort series from I.R. Iran and Indonesia.

TABLE 7. Longtail tuna (*Thunnus tonggol*) stock status summary

Management Quantity	Aggregate Indian Ocean
2013 catch estimate	158,996 t
Mean catch from 2009–2013	151,829 t
MSY (80% CI)	120 Kt [79–171 Kt]t
Data period used in assessment	1950–2012
F_{MSY}	0.39 (0.27–0.51)
B_{MSY}	255 Kt (173–377 K t)
F_{2012}/F_{MSY} (80% CI)	1.23 (0.47–2.11)
B_{2012}/B_{MSY} (80% CI)	1.05 (0.59–1.49)
SB_{2012}/SB_{MSY}	–
B_{2012}/B_0 (80% CI)	0.53(0.3–0.75)
SB_{2012}/SB_0	–
$B_{2012}/B_{0,\ F=0}$	–
$SB_{2012}/SB_{0,\ F=0}$	–

LITERATURE CITED

Chiang W-C, Hsu H-H, Fu S-C, Chen S-C, Sun C-L, Chen W-Y, Liu D, Su W-C (2001) Reproductive biology of longtail tuna (*Thunnus tonggol*) from coastal waters off Taiwan. IOTC–2011–WPNT01–30

Froese R, Pauly DE (2009) FishBase, version 02/2009, FishBase Consortium, <www.fishbase.org>

Griffiths SP, Fry GC, Manson FJ, Lou DC (2010a) Age and growth of longtail tuna (*Thunnus tonggol*) in tropical and temperate waters of the central Indo-Pacific. ICES JMar Sci 67:125–134

Griffiths S, Pepperell J, Tonks M, Sawynok W, Olyott L, Tickell S, Zischke M, Lynne J, Burgess J, Jones E, Joyner D, Makepeace C, Moyle K (2010b) Biology, fisheries and status of longtail tuna (*Thunnus tonggol*),with special reference to recreational fisheries in Australian waters. FRDC Final Report 2008/058, 101 pp

Kaymaram F, Darvishi M., Parafkandeh F, Ghasemi S,Talebzadeh SA (2011) Population dynamic parameters of *Thunnus tonggol* in the north of the Persian Gulf and Oman Sea. IOTC–2011–WPNT01–18